SIMCOM
TRAINING CENTERS

TO: Owners and Operators of Turboprop Aircraft
FROM: Tracy Brannon, Sr. Vice President and Managing Director
RE: *Aviation International News* Reprint

Here is a reprint of an article that appeared in *Aviation International News*. It deals specifically with initial and recurrent training on the Pilatus PC-12, but it contains many valid observations about the value and wisdom of thorough training in complex aircraft.

Consider the following excerpts:

"… pilots need more training than the FAA requires…"

"… I gained a great appreciation for the importance of taking the time to learn a complex airplane…"

"… flying a complex turboprop is clearly more demanding than flying a typical single-engine piston airplane…"

I hope you will take the time to read the article. It is a very objective and on-target presentation of the importance of professional training. For owners and operators of single or multi-engine turbine powered aircraft, there is no better place for you to get that training than SimCom Training Centers. Call us with any questions you might have. We will be happy to discuss our training curriculum and capabilities with you, and we can schedule your next training event at one of our conveniently located, modern training facilities.

We look forward to serving you.

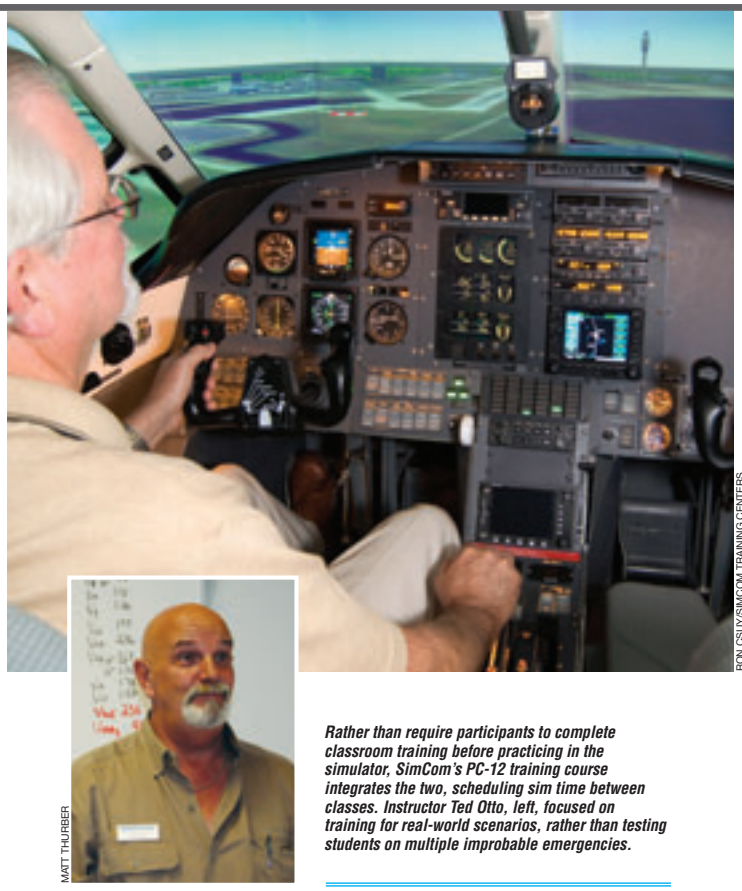
Tracy Brannon

SOLID VALUE
PERSONALIZED TRAINING
FRIENDLY ENVIRONMENT

PC-12 SIMULATOR WORK

Before flying these complex airplanes, pilots need more training than the FAA requires

by Matt Thurber



RON CSUY/SIMCOM TRAINING CENTERS

MATT THURBER

Rather than require participants to complete classroom training before practicing in the simulator, SimCom's PC-12 training course integrates the two, scheduling sim time between classes. Instructor Ted Otto, left, focused on training for real-world scenarios, rather than testing students on multiple improbable emergencies.

SimCom instructor Ted Otto knows the PC-12. With about 3,000 hours flying the roomy single-engine Swiss turboprop, Otto is one of those rare pilots who not only knows his subject intimately but also knows how to share his knowledge with pilots who travel to SimCom Training Centers' Orlando, Fla. headquarters to learn how to fly the PC-12. I spent five days with Otto at SimCom attending the PC-12 initial class, then shortly afterwards flew two PC-12 flights to see how the airplane performs in the real world.

At SimCom, classes are small, with just two or three students. My classmate, Bruce Taylor, who had just purchased a -9 PC-12 but hadn't yet flown it, came for the initial course to prepare to fly his new airplane. Taylor has a few hundred fixed-wing hours and many more helicopter hours. His last airplane was a Cirrus SR22, but he needed more range and speed. The PC-12 would be a fairly big step, combining the retractable landing gear and constant-speed propeller of a high-performance single with a turbine engine, pressurization and the challenges of properly loading a single-engine airplane that can carry a huge load and about seven hours of fuel.

SimCom held its first PC-12 training class in September 1994, with training conducted in the customer's airplane. In 1998 SimCom began training pilots in its first PC-12 flight training device (a non-motion simulator with motion-cuing visual display), and now there are two simulators in Orlando, one in Scottsdale and a new one with the Next Generation PC-12's Honeywell Apex cockpit recently added in Orlando.

SimCom's piston and turboprop simulators use electronic control loading to mimic the feel of flight controls and when combined with the motion-cuing visual displays that play on large windshield-filling screens, they make for a realistic training medium. SimCom engineers incorporate other senses into the training mix, too; the simulators accurately replicate all the real airplane's sounds, including the "whoosh" of the oxygen lever on the panel and smoke from the burning-wire emergency scenario. Unlike the jet simulators, which are motion-based, the piston and turboprop simulators don't offer motion but are built from actual cockpits using real aircraft components.

While flying the FTD, I felt as though we were airborne. One time, when we crashed during a pitch trim failure, I closed my eyes at the last moment before we "hit" the ground after attempts to remedy the problem left us in a severe nose-down attitude and rapidly picking up speed. As Otto reset the FTD, he said it takes a few minutes to unscramble its brains, then chuckled at my realistic reaction as we had drilled a hole somewhere near Orlando Executive Airport.

The trim problem illustrated the utility of the SimCom FTD. Even though it doesn't move, the device imparts most of the feel of flying and accurately reproduces the PC-12's characteristics for safe practice of emergencies. Until I attended the PC-12 class, I had assumed that all airplanes allow the pilot to shut off the pitch trim using the autopilot disconnect button. This is not the case in the PC-12, however, and Taylor and I quickly had this point amply reinforced in the FTD.

The proper method for handling PC-12 pitch trim runaway is to push the pitch trim interrupt switch on the center console–quickly, because the runaway is likely nose down trim–then pull the circuit breaker and use the alternate stab trim to retrim. Forget about using the autopilot disconnect button on the yoke; it won't help. In a dire emergency, one could shut off the battery switch, but that would turn off all the avionics, and that isn't an option on the emergency checklist. Going through this exercise also taught me how quickly a pilot must respond to a trim runaway and gave me new understanding of how some jets have crashed following trim failures shortly after takeoff. The airplane gets out of control in just a few tense moments.

After two days of training, Taylor and I gained a great appreciation for the importance of taking the time to learn a complex airplane like the PC-12 thoroughly. FAA regulations allow a piston-engine private pilot without any training beyond the 10 hours needed for a complex endorsement to hop into an airplane like a PC-12 and, if the pilot doesn't fry the Pratt & Whitney Canada PT6 trying to start it, take off with a full load of passengers.

No insurance company will cover a pilot without any flying time in a PC-12, which helps ensure that inexperienced pilots take the training and get some seasoning before flying on their own. Taylor's insurer insisted that he fly 125 hours with a mentor who is well qualified in the PC-12. Taylor's mentor pilot, in fact, was at SimCom at the same time taking the PC-12 recurrent class.

Preparation

Soon after signing up for the SimCom class, I received a large box full of material that included a PC-12 pilot's information manual, SimCom's emergency procedures guide, a normal procedures and a limitations book, laminated checklist, cruise power chart and annunciator panel cheat sheet and a huge binder containing SimCom's PC-12 reference manual.

This manual deserves notice, because someone at SimCom clearly spent a good deal of time writing the content in a way that is easier to understand than the dry language used in the pilot's handbook. The reference manual goes through each system in a logical fashion, mirroring the progression of the ground school class, and includes many helpful illustrations and convenient color illustrations of each part of the PC-12 instrument panel. I found it useful to lay these out on the floor in my hotel room in roughly the same order as the simulator cockpit, then practice normal and emergency procedures to gain more familiarity with switch, control and circuit-breaker locations.

In retrospect, I should have spent more time before traveling to Orlando studying the reference manual; this would have cut down on time spent in the simulator just learning and understanding switch locations and functions.

SimCom might consider adding a note in the package that recommends the student focus on learning the cockpit first, then study the reference manual. I spent some time studying the pilot's handbook, but that time would have been better spent with the easier-to-understand reference manual.

Class Begins

When class began, Otto didn't waste any time and we were soon delving into the technical details of the PC-12's Pratt & Whitney Canada PT6A-67B engine. The first item of business, however, was introducing us to some information that we'd need, such as airspeeds and the ubiquitous pretakeoff mnemonic device, FATFLY, which stands for Flaps And Trim, Flight idle, Landing and taxi lights on, Yaw damper off. This became tremendously useful in the simulator, especially during repetitive takeoff exercises.

After the engine introduction and a discussion about differences between the various PC-12 models, Otto explained the trim-runaway emergency procedure. In the PC-12, a unique warble tone warns of the failure, if rapid loss of pitch control hasn't already alerted the pilot. This was one of those lessons where paying attention in class pays off in the simulator, as Taylor and I discovered the first time Otto surprised us with a trim failure.

Our first simulator session started with the all-important checklist, which we each followed to the letter every time we flew. While adhering to the checklist adds a lot of time to the simulator sessions–and must be painfully tedious for the instructor–our familiarity with the cockpit improved rapidly after so much repetition. By the time I climbed into the front seat of a real PC-12, I knew exactly where to look for every switch and knob.

We practiced ordinary airwork in the first session, including takeoffs, normal and steep turns, landings and stick shaker/pusher demos. The real benefit of the training was apparent when Otto explained why PC-12 engineers designed certain items to work the way they did and why it's important to understand these things. Flying a complex turboprop such as the PC-12 is clearly much more demanding than flying a typical single-engine piston airplane.

One example of this is the pusher-ice mode for the stall warning system. This mode increases the speed at which the stall warning sounds and the speed at which the

stick pusher shoves the nose down. In the pusher-ice configuration, the pilot has to be aware that if the airplane gets too slow, the pusher will actuate and passengers might be alarmed by the resulting negative g loading. During an engine-out emergency landing, this could be an issue if the airplane were allowed to get too slow trying to stretch the glide. A stick-pusher actuation close to the ground won't have a happy ending.

Another example of Otto's excellent knowledge of the PC-12 is his explanation of the airplane's central advisory and warning system (CAWS), which looks like a simple annunciator panel but delivers a lot of information about the airplane. The fuel pump CAWS green advisory light, Otto told us, means only that power is being supplied to the pump; it does not necessarily mean that the pump is working. This information came in handy during a simulator session where we learned how to deal with a fuel imbalance caused by a pump that appeared to be working properly.

Sim Flying

We flew the simulator twice each day, interspersed with ground school sessions. This kept us alert most of the time because we didn't have to spend a lot of time in the class before flying the simulator. SimCom uses the strategy to smooth the transition from classroom to airplane. On the second day, we practiced a variety of high-performance takeoffs and landings and got to see what happens to a PT6 that is allowed to hot start. Otto surprised Taylor with the runaway trim, and the subsequent smoking hole in the virtual ground left no doubt that we had both learned the meaning of that oddly insistent warble tone.

SimCom's classrooms are equipped with modern computers so Otto was able to present videos and other graphical material. During ground school he showed us a dramatic stall series video from PC-12 flight tests that cured us of any desire to stall the big single. The test pilot lost a lot of altitude. "Do not stall," Otto warned.

We flew ILS approaches on day four, both with and without the autopilot. Otto had us using the autopilot on most flights once we got used to the feel of the simulated PC-12's controls, which is exactly how pilots need to be trained. Pilots without professional training rarely learn how to use autopilots properly, and this was a good refresher for both of us.

The simulator session on engine-out emergencies was an eye-opener. Before we took off, Otto asked us what we thought the airspeed would be for best positioning ourselves to cope with engine failure after takeoff. I assumed that nailing the speed for best angle of climb would get the airplane to the highest altitude in the least distance, so Otto had us try that.

Every time he failed the engine after takeoff, however, we couldn't make it back to the runway if we had nailed the speed for best angle or even best rate of climb. But when we lowered the nose to accelerate to the sea-level cruise-climb speed of 160 knots, the difference was dramatic. Now, when Otto failed the engine, the PC-12 had enough excess energy for us to slow to best glide speed and turn back and make it, maybe not all the way to the runway, but at least onto the airport. In some cases we even had time to lower the gear before touching down on the runway. We did this enough times that Taylor and I were convinced of the benefits of the 160-knot cruise climb.

While no instructor would advise trying to turn back at too low an altitude following a post-takeoff engine failure, what Otto did teach us was how greatly safety margins are increased after engine failure in a heavy airplane like a PC-12 when the pilot chooses to carry excess energy in the form of airspeed.

During the class, Otto always sought to deliver the latest information. If he didn't know the answer to a question, he would telephone an expert during class instead of waiting until later. Otto consistently taught as an instructor whose job is to impart information, not to see if a student can handle multiple improbable emergencies. "Remember," he told us, "it's not a test; it's training." If an engine failure combined with a stuck landing gear and complete electrical failure were likely, Otto would teach us how to handle it. "I don't think [multiple failures] are likely to happen," he said. "That's not quality training."

Real-airplane Training

PC-12 students have the option of staying an extra day for some additional simulator time on Saturday or, if they have their airplane nearby, flying with the instructor. Taylor took advantage of that opportunity and stayed on Saturday for more simulator time.

Taylor enjoyed the SimCom training experience, his first time learning in a formal classroom and simulator. Not having flown such a complex airplane before, he found the training to be a bit like "drinking from a firehose," he said. Although he would like to have spent more time learning the airplane in ground school at a slower pace, more time in the simulator wouldn't have helped. "At some point you have to go and fly," he said.

As of early January, Taylor had flown his -9 series PC-12 about 35 hours before it went to the avionics shop for a radio upgrade. Flying the real airplane for the first time was comfortable as he knew exactly where all the switches were located. "The airplane is heavier-feeling," he said. "It requires more control force than the simulator."

The one area where it's hard to replicate the airplane with the simulator is the final phase of landing, the touchdown. "You just have to get in the airplane and go do them," he said. "We spent a whole day doing nothing but landings. It's a very easy airplane to land, easier than the Cirrus. We had some pretty good crosswinds, and it handles it well, just straightens right out."

Taylor's farthest trip during those 35 hours was a three-hour 25-minute flight from his home base in Tulsa, Okla., to Manchester, N.H., ending with an ILS approach to minimums. "It was more exhilarating than the simulator," he said.

Two companies let me fly PC-12s after I completed the SimCom PC-12 course, avionics manufacturer Innovative Solutions & Support and Wing Aviation. IS&S uses its -9 series PC-12 as a flying testbed and demonstration airplane for its glass-cockpit modifications, and Wing Aviation, a Houston-based charter operator, has a later model -10 series PC-12 in its management fleet.

As I'd heard from other pilots and SimCom instructor Otto, the -9 PC-12's flight controls are heavier in roll than the -10, and this proved accurate. The SimCom PC-12 simulator's roll controls were not as heavy as those of the real -9, but not as light as those of the real -10. The -9 has larger winglets and is slightly harder to handle in a crosswind, according to Wing Aviation pilot Shanon Baker, while the -10 has smaller winglets and ailerons with servo tabs that improve handling.

Both the IS&S and Wing Aviation PC-12s are equipped with the IS&S glass cockpit, which replaces the original Bendix/King EFIS 50 cathode-ray-tube displays with large liquid crystal displays. The IS&S PC-12 is equipped with two 10-inch LCDs in front of the pilot and one 15-inch display on the right-hand panel, while Wing Aviation's PC-12 has four 10-inch displays.

The neatest feature on the IS&S avionics system is the bug zoom. When adjusting items such as the airspeed bug, barometric setting, altitude or heading, the number blooms or expands for two seconds so the pilot gets instant feedback about which knob he selected. If the pilot selects altitude when he meant to choose the baro setting knob, he'll know instantly as the altitude number expands, giving immediate feedback about his selection. IS&S has patented this zoom feature. "I love it," said IS&S test pilot Eric Smedberg. "It keeps your eye on the screen."

Buyers of the IS&S panel mod can opt for either a traditional single-cue flight director display or a split cue, which looks like VOR and glideslope needles and, I found while flying the IS&S airplane, takes some getting used to. The big IS&S displays are a great improvement to the PC-12, which is long overdue for an LCD upgrade.

Baker has flown more than 200 hours in Wing Aviation's managed PC-12 and likes the IS&S zoom feature. The Wing PC-12 is configured with the single-cue flight director, a style that Baker prefers. Baker also wishes that the PC-12 had an automatic pressurization system, a feature that he is familiar with from past jobs flying a Sabreliner and an Avanti. The Next Generation PC-12, expected to enter service shortly, incorporates some of the features that buyers have been asking for, including a four-display Honeywell Primus Apex glass cockpit and digital pressurization control.

I flew the IS&S PC-12 for about an hour near the IS&S headquarters in Exton, Penn., and tried some basic maneuvers to see how it felt after the SimCom training, including a hand-flown ILS Runway 01 approach at nearby New Castle Airport in Wilmington, Del. The SimCom training helped me feel instantly comfortable in the PC-12, even though I had never flown with the IS&S displays. The IS&S engineers have done a great job designing a simple, intuitive system.

In the Wing Aviation PC-12, I joined Baker for two legs, first taking the PC-12's owner from Hobby Airport in Houston, to Lakefront Airport in New Orleans, then two other family members from New Orleans to Birmingham, Ala. This trip illustrated the PC-12's utility, although we did end up dodging and weaving a bit to avoid some heavy thunderstorms at the mid-20s flight levels that are the normal altitudes flown by PC-12s. Baker commented that in the Sabreliner he would have been able to fly over the storms.

At Lakefront Airport, the two passengers arrived laden with Christmas presents that would stay in the PC-12 until Baker flew it to Aspen a few days after the Birmingham leg. The presents were light, but they took up a lot of volume, filling most of the rear baggage space and the rear seats. A King Air 200, with 30 cu ft less cabin space, probably could have carried the same load but all the packages would have to be loaded through the cabin entry door; the PC-12's huge baggage door made loading easy. This trip would never have worked in a small or even midsize jet.

MATT THURBER

The training provided good preparation for flying the -9 series PC-12, although the roll controls in the real airplane were a bit heavier than those in the sim.

On the way to Birmingham, we swung wide around some gigantic thunderstorms that were slowly moving to the east. Not being able to climb above 30,000 feet is somewhat limiting, but that's one of the prices owners pay for flying a single-engine turboprop. The ride was bumpy, but the PC-12 handled the turbulence comfortably, the yaw damper easily keeping the tail from swinging. In cruise, the PC-12 averaged more than 250 ktas while burning less than 500 pounds per hour.

On final approach into Birmingham, the PC-12 seemed to be flying sideways. We plowed through a strong wind shear on final, then Baker skillfully lined up with the runway despite the 20-knot direct crosswind and touched down gently on the PC-12's trailing-beam landing gear. ❑

SIMCOM

The Turboprop Training Specialists

Beech King Air

Mitsubishi MU-2

Cessna Conquest

Piper Cheyenne

Pilatus PC-12

TBM 700/850

Piper Meridian

Here are just some of the reasons we are the "Training Center of Choice" for turboprop owners and operators:

- High Value For Your Training Dollar To Help Control Training Budgets
- Class Content Customized To Individual Needs
- Flexible Simulator Scheduling Completes Your Training Quickly And Efficiently
- Training Programs Approved By All Major Insurance Underwriters
- Part 135 Training Available

Call today for complete details or to schedule your next training event

1.800.272.0211

SIMCOM
TRAINING CENTERS

Phone: 407.275.1050 • Email: info@simulator.com

ORLANDO
SCOTTSDALE
VERO BEACH

www.simulator.com